

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



Physiology

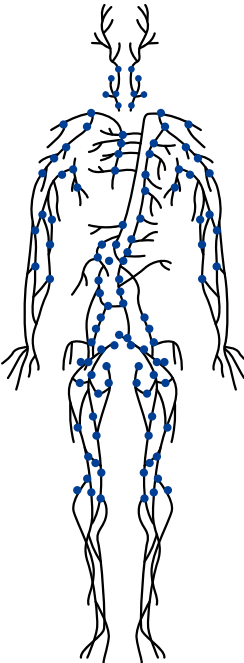
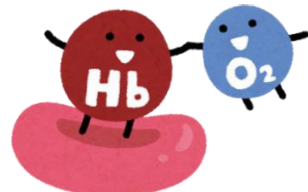
MID | Cases

﴿وَقُلْ رَبِّ أَدْخِلْنِي مُدْخَلَ صِدْقٍ وَأَخْرِجْنِي مُخْرَجَ صِدْقٍ وَاجْعَلْ لِي مِنْ لَدُنْكَ سُلْطَانًا نَصِيرًا﴾
ربنا آتانا من لَدُنْكَ رَحْمَةً وَهَيِّئْ لَنَا مِنْ أَمْرِنَا رَشَدًا

Discussion

Clinical cases

Written by: Maria Alrawi



Discussion

Clinical Cases

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A 45-year-old man presents to the emergency department with a 2-week history of diarrhea that has gotten progressively worse during the past several days. He has minimal urine output and is admitted to the hospital for dehydration. His stool specimen is positive for parasitic eggs. Which type of WBC would have an elevated number?

- A. Eosinophils
- B. Neutrophils
- C. T lymphocytes
- D. B lymphocytes
- E. Monocytes

Parasitic infection = eosinophils

A 24-year-old man came to the emergency department with a broken leg. A blood test revealed his WBC count to be $22 \times 10^3/\mu\text{l}$. Five hours later, a second blood test revealed values of $7 \times 10^3/\mu\text{l}$. What is the cause of the increased WBC count in the first test?

A) Increased production of WBCs by the bone marrow

B) Release of pre-formed, mature WBCs into the circulation

C) Decreased destruction of WBCs

D) Increased production of selectins

Explanation:

1- broken leg

2- WBC count 22000 (normal 10,000-15,000) --> high

They are normally present in the bone marrow but they were released due to the fracture where the bone marrow was exposed to the blood --> fast induction in WBCs which are already stored in bone marrow

Q: why not “increased production of WBCs”???? Because it needs time (he came directly to emergency after the fracture) so 5 hours aren’t enough to explain neutrophilia
Someone said: this can happen in infection (1 choice) The doctor said yes but it happens within the first day (24h)

A 62-year-old man who was known to have a normal blood cell count and differential count 3 months ago presents with pallor, bone pain, bruising, and a WBC count of 42,000. Eighty-five percent of cells in the circulation appear to be immature granulocytes. What is the diagnosis?

- A) Acute lymphocytic leukemia
- B) Acute myelocytic leukemia
- C) Chronic lymphocytic leukemia
- D) Chronic myelocytic leukemia

B) The WBC count of 42,000 is higher than the range usually seen as a response to infection and suggests leukemia. The patient's florid clinical presentation suggests an acute process, and findings of a normal CBC 3 months previously confirm that this patient has an acute leukemia. Granulocytes are myeloid cells, and the fact that they are in the circulation while still being immature is wholly compatible with leukemia. Thus the patient has acute myelocytic (also referred to as "myelogenous" or "myeloid") leukemia



The previous explanation was written by the doctor

Discussions in the lecture:

Firstly, All the choices suggest leukemia, so definitely it is

Secondly, myelocytic or lymphocytic? We have the word “ granulocytes” = myelocytic

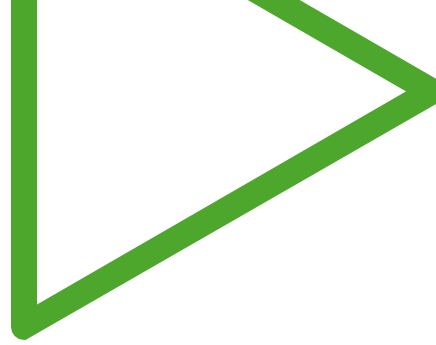
Thirdly, acute or chronic?? Notice that he had normal tests three months ago, which means his case is newly developed = acute

Answer: acute myelocytic leukemia

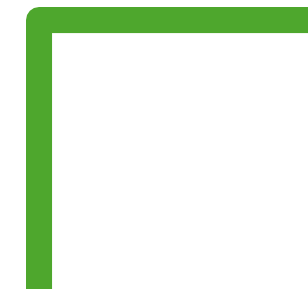
65-year-old alcoholic experienced chest pain and cough with an expectoration of sputum. A blood sample revealed that his WBC count was $21,000/\mu\text{l}$. What is the origin of these WBCs?

- A) Pulmonary alveoli
- B) Bronchioles
- C) Bronchi
- D) Trachea
- E) Bone marrow

They are present in the lungs but definitely not originated there – in case the sample was taken from sputum, you might mistakenly think of lungs – but here it is a blood sample so the answer is bone marrow, no doubts



• An 8-year-old boy frequently comes to the clinic for persistent skin infections that do not heal within a normal time frame. He had a normal recovery from the measles. A check of his antibodies after immunizations yielded normal antibody responses. A defect in which of the following cells would most likely be the cause of the continual infections?

- A) B lymphocytes
 - B) Plasma cells
 - C) Neutrophils
 - D) Macrophages
 - E) CD4 T lymphocytes
- 
- 



Let's think sequentially

- 1- persistent skin infections which don't heal in the normal time
- 2- when he had measles, antibodies were present + he responded to immunization (normal titers)
 - let's start by excluding
 - 1) B lymphocytes, impossible -antibodies are normal → excluded
 - 2) plasma cells, same concept as B lymphocytes → excluded
 - 3) neutrophils maybe 😞 (keep it into consideration)
 - 4) macrophages (possible)
 - 5) T helper (also possible)

Let's remember the story of immune response:

Firstly macrophages, they phagocytose the pathogen and present it to T lymphocytes

Secondly T Helper cell is activated , T cytotoxic & B lymphocytes

* we reached the level where B lymphocytes are normal, so definitely everything lead to it was normal!!!

As a result & by exclusion neutrophils is the answer

Neutrophils are the second line defense, but is considered as early defense & the body relies on them, so when they are deficient persistent infections take place (in skin or even lungs)

Students Qs:

Someone asked something about dendritic cells and their role in antigen presenting, The doctor said dendritic cells are not as common as macrophages neither present in all tissues, so they have limited activity, that's why if there is a problem in antigen presentation we refer it to macrophages. Another reason, macrophages has a stronger effect on bone marrow.

Another question was asked about mast cells and if they can be the problem, The doctor said mast cells & basophils have major role in allergy, it's true that they take part in inflammation aggravation but they're mainly responsible for hypersensitivity rxns

year-old child who has had frequent ear infections is found to have reduced immunoglobulin levels and is unresponsive to vaccination with tetanus toxoid. However, the child has normal skin test reactivity (delayed redness and induration) to a common environmental antigen. Which cell lineage is not functioning normally?

- A) Macrophages
- B) Helper T cells
- C) Cytotoxic T cells
- D) B cells



Explanation:

1- the child has a problem in antibodies (it's true to think about B cells but other choices might also be possible :)

2- delayed redness & enduration which refers to T cytotoxic cells!! So both T cytotoxic & T helper cells are normal & functional

Conclusion: definitely the problem is in B cells for not producing antibodies

Students Qs:

A Student asked: why delayed not immediate allergy??

A: according to the type of allergy, in this question it is delayed, why?

IgE are responsible for fast response & they're immunoglobulins, which are released by B cells (already defected)

Note: usually when there's a problem in antibodies titers we suspect a defect in T helper but here we got the delayed redness which means T cells are normal.

A patient with human immunodeficiency virus (HIV) exhibit abnormal functioning of which of the following mechanisms?

- A) Antibody production only
- B) T cell–mediated cytotoxicity only
- C) Degranulation of appropriately stimulated mast cells
- D) Both antibody production and T cell–mediated cytotoxicity

In HIV, we have a problem in all of the following:

T lymphocytes, B lymphocytes, Macrophages & Granulocytes due to the defect in T helper which actually exhibits an effect on them.

We have 2 arms: Macrophages activate T helper & T helper activates macrophages – increases its differentiation & the time of residency in tissues, through slowing it down when it reaches site of infection so it becomes more localized in the site of infection.

- A woman whose blood type is A, Rh positive, and a man whose blood type is B, Rh positive, come to the clinic with a 3-year-old girl whose blood type is O, Rh negative. If they told you that they are natural parents of this child, are blood types correct regarding their claim?

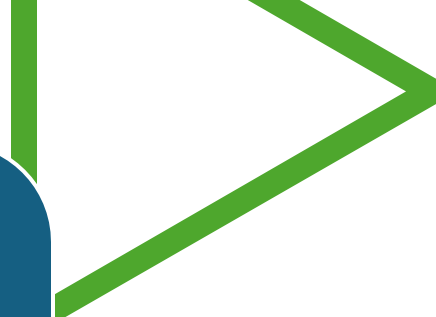
- A) The woman can be the child's natural mother, but the man cannot be the natural father
- B) The man can be the child's natural father, but the woman cannot be the natural mother
- C) Neither adult can be the natural parent of this child
- D) This couple can be the natural parents of this child

Both parents have the 2 alleles:

Mother A, O → A

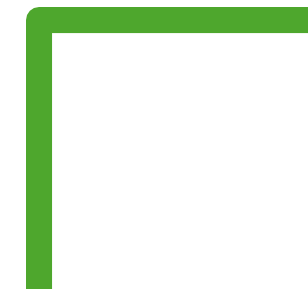
Father B, O → B

And both parents have the Rh- as a second allele, so yes it's possible!!



A woman whose blood type is A positive and who has always been healthy just delivered her second child. The father's blood type is O negative. Because the child's blood type is O negative (O, Rh negative), what would you expect to find in this child?

The baby will not be affected in this case

- A) Erythroblastosis fetalis due to rhesus incompatibility
 - B) Erythroblastosis fetalis due to ABO blood group incompatibility
 - C) Both A and B
 - D) The child would not be expected to have HDN
- 
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****Final material**

Which statement is true?

- A) In a transfusion reaction, agglutination of the recipient blood occurs
- B) Shutdown of the kidneys after a transfusion reaction occurs slowly
- C) Blood transfusion of Rh-positive blood into any Rh-negative recipient will result in an immediate transfusion reaction
- D) A person with type AB Rh-positive blood is considered a universal recipient

The recipient blood has the larger amount of plasma and thus antibodies. These antibodies will act on the donor RBCs. The donor's plasma will be diluted and have minimal effect on the recipient's RBCs. With any antigen–antibody transfusion reaction a rapid breakdown of RBCs occurs, releasing hemoglobin into the plasma, which can cause rapid acute renal shutdown. Transfusion of Rh-positive blood will only result in a transfusion reaction if the Rh-negative person has previously undergone a transfusion or been exposed to Rh-positive antibodies. Type AB Rh-positive people have no antibodies to the A, B, or Rh(D) antigens in their plasma, so they can receive any blood type

The doctor added the previous explanation, it is really close to what have been said, take a look.

A) In transfusion rxn agglutination of the recipients blood occurs #wrong; agglutination of the donors blood

Explanation: the recipients immune system attacks the donors RBCs, the opposite never happens even if we did whole blood transfusion because the antibodies in the small volume of donors plasma will be diluted in the large volume of recipients plasma → no big effect.

للي حضر محاضرة سكتشن ٣ صار نقاش طويل على سؤال كان فيو

reticulocyte count

المهم إنه الدكتور حذفته، وبالتوفيق جميعًا، دعواتكم

For any feedback, scan the code or click on it.



Corrections from previous versions:

Versions	Slide # and Place of Error	Before Correction	After Correction
V0 → V1			
V1 → V2			